

## REMARKS

Claims 1 - 20 remain active in this application. Claims 2, 3, 5 and 10 have been amended to improve form. Claims 1 and 14 have been amended to emphasize novel features of the invention. Support for the amendments of the claims is found throughout the application, particularly in Figures 13 and 14, for example, and the description thereof on page 28. No new matter has been introduced into the application. The indication of allowability of claim 4 and the lack of any rejection of claims 2 or 3 based on prior art are noted with appreciation.

The Examiner has objected to claims 2 and 3 as being improper dependent claims in failing to further define the voltage regulator of claim 1. This objection is respectfully traversed as being moot in view of the amendments made above which include recitations explicitly further defining the voltage regulator.

Claims 5 and 10 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite due to inexact antecedent language correspondence. This ground of rejection is respectfully traversed as being moot in view of the amendments made above in which the antecedent language references have been made exact.

Claims 1, 5, 6, 8, 10 - 12, 14, 15, 17, 19 and 20 have been rejected under 35 U.S.C. §102 as being anticipated by Liu et al.; claims 7, 9, 16 and 18 have been rejected under 35 U.S.C. §103 as being unpatentable over Liu et al. in view of the Kingsepp publication; and claim 13 has been rejected under 35 U.S.C. §103 as being unpatentable over Liu et al in view of Schuellen. These grounds of rejection are respectfully traversed.

The invention is directed to a two-stage voltage regulator and combination thereof with a load device in

which the efficiency of the voltage regulator is improved by adjusting the voltage input to the second stage in accordance with operational mode of the load or output current of the second stage to meet the current demands of that output stage and does so while avoiding voltage transients when the load current changes significantly. This is done to improve the overall efficiency of the two-stage regulator and the second stage, in particular. It has been recognized by the inventors that the voltage input to the second stage yielding highest efficiency will vary with load current and the first stage is controlled such that the voltage input to the second stage closely tracks (either continuously or step-wise) the output current of the second stage.

While Liu et al. discloses a two-stage regulator where the first stage voltage may be varied, the arrangements and embodiments disclosed therein are not concerned with voltage regulator efficiency but only with achieving small ripple and peak currents and rapid response to load transients. While it is disclosed that other signals could be used which reflect conditions in the second stage, Liu detects load transients by detecting a pull-down of the second stage output voltage and arranges control voltages such that only severe changes greater than a given voltage drop (e.g. close to a loss of regulation) will cause a response which causes a brief increase in the first stage output to the second stage (see, for example, paragraph 51, at the last few lines of the left-hand column of page 4 and Figure 5A (e.g. the "don't care" output of comparator 68)). Otherwise, increased steady state loads cause a reduction of input voltage to the second stage as the load current draws down the voltage of both the first and second stages; which performance actually *decreases efficiency*. Further, it should be recognized that Liu et al. basically responds by

altering the duty cycle of the first stage to increase the current supplied to the second stage and, while there may or may not be a voltage change at the output of the first stage, it is incidental while the invention explicitly claims producing a voltage change at the input of the second stage which supports the function of increasing efficiency.

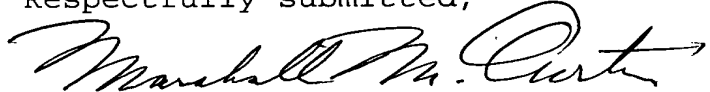
Thus it is seen that Liu et al. does not answer the explicit recitations of "supplying a voltage corresponding to said operational mode or said current consumption as said input voltage to said regulator stage" (emphasis added) contained in both independent claims 1 and 14, and thus Liu et al. does not anticipate any claim in the application. In regard to the grounds of rejection under 35 U.S.C. §103, the secondary references applied are not seen to mitigate the very basic deficiency of Liu et al. discussed above and the Examiner has not asserted that either secondary reference does so. Therefore, it is respectfully submitted that the Examiner has not made a *prima facie* demonstration of anticipation or obviousness of any claim in the application. Additionally, in regard to claim 7 it appears that the Examiner may have confused  $R_{\text{droop}}$  which Kingsepp discloses and  $R_{\text{tilt}}$  which Kingsepp does not teach or suggest. The prior art applied by the Examiner does not provide any evidence of a level of ordinary skill in the art which would support a conclusion of obviousness of any claim since the prior art does not lead to an expectation of success in achieving improved efficiency by changing second stage input voltage and, any modification of any of the references to answer the recitations of the claims, particularly as amended above would be improper under the precedent of *In re Gordon*, 221 USPQ 1126 (Fed. Circ., 1984) since any such modification would preclude the apparatus of the respective references for operating in the intended manner. Accordingly, it is

respectfully submitted that the asserted grounds of rejection are in error and untenable and reconsideration and withdrawal thereof are respectfully requested.

Since all rejections, objections and requirements contained in the outstanding official action have been fully answered and shown to be in error and/or inapplicable to the present claims, it is respectfully submitted that reconsideration is now in order under the provisions of 37 C.F.R. §1.111(b) and such reconsideration is respectfully requested. Upon reconsideration, it is also respectfully submitted that this application is in condition for allowance and such action is therefore respectfully requested.

If an extension of time is required for this response to be considered as being timely filed, a conditional petition is hereby made for such extension of time. Please charge any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041.

Respectfully submitted,



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